What is claimed is:

1. A method of producing an aqueous solution of chlorine dioxide comprising:

a) providing liquid water in a first zone and at least one metal chlorite and at least one acid forming component in a second zone, said first and second zones being separated by a membrane;

b) contacting said membrane with water from said first zone such that liquid water and/or water vapor passes through said membrane into said second zone thereby facilitating the reaction between said at least one acid forming component and said at least one metal chlorite to produce chlorine dioxide; and

c) allowing the chlorine dioxide produced in the second zone to pass out through said membrane to the first zone into the liquid water to form said aqueous solution.

2. The method of claim 1 wherein the metal chlorite is selected from the group consisting of alkali metal chlorites and alkaline earth metal chlorites.

3. The method of claim 1 wherein the metal chlorite is sodium chlorite.

4. The method of claim 1 wherein the acid forming component is a dry water soluble solid which produces an acidic solution when dissolved in water.

5. The method of claim 4 wherein the acid forming component is selected from the group consisting of acids, acidic salts, and organic acid anhydrides.

6. The method of claim 5 wherein the acid is selected from organic acids.

7. The method of claim 6 wherein the organic acids are selected from the group consisting of citric acid, tartaric acid, and oxalic acid.

8. The method of claim 7 wherein the organic acid is citric acid.

9. The method of claim 5 wherein the acidic salts are selected from the group consisting of alkali metal acidic salts and alkaline earth metal acidic salts.

10. The method of claim 5 wherein the acidic salts are selected from the group consisting of magnesium nitrate, lithium chloride, magnesium sulfate, aluminum sulfate, sodium acid sulfate and potassium acid sulfate.

11. The method of claim 5 wherein the acid anhydride is maleic anhydride.

12. The method of claim 1 wherein the acid forming component is a solid, water insoluble hydrogen ion exchange material.

13. The method of claim 12 wherein the acid forming component is selected from the group consisting of synthetic molecular sieves and acid ion exchange resins.

14. The method of claim 13 wherein the synthetic molecular sieves are selected from the group consisting of synthetic zeolite Y, dealuminated Y, mordenite and ZSM-5.

15. The method of claim 1 wherein the acid forming component produces a pH of below about 5 when mixed with water.

16. The method of claim 1 wherein the aqueous solution of chlorine dioxide has a pH of between from about 2 to about 10.

17. The method of claim 1 wherein the membrane is water softenable.

18. The method of claim 17 wherein the membrane is at least partially water soluble.

19. The method of claim 18 wherein the membrane dissolves in water after a period of time at least equal in length to the time it takes the metal chlorite and the acid component to substantially react to produce chlorine dioxide.

20. The method of claim 1 wherein the membrane is made of a material selected from the group consisting of gelatin, polyvinyl alcohol, cellulose and derivatives thereof.

21. The method of claim 20 wherein the derivative of cellulose is hydroxypropyl methyl cellulose.

22. The method of claim 1 wherein the membrane is made of a material which is not substantially water soluble.

23. The method of claim 22 wherein the membrane material is made from a microporous nonwoven hydrophobic polymer.

24. The method of claim 23 wherein the microporous nonwoven hydrophobic polymer is selected from polyethylene and polytetrafluoroethylene.

25. The method of claim 1 comprising providing openings through the membrane of sufficient size to enable the controlled passage of water into contact with the metal chlorite and the acid forming component.

26. A device which generates chlorine dioxide in the presence of water but not in the substantial absence of water, the device comprising a membrane defining, at least in part, an enclosed space, said enclosed space containing at least one metal chlorite and at least one acid forming component, said membrane is made of a material which permits: (a) liquid water and/or water vapor to pass therethrough into the enclosed space to allow the at least one metal chlorite and at least one acid forming component to react to produce chlorine dioxide and (b) the so produced chlorine dioxide to pass therethrough out into the liquid water to produce the product solution containing chlorine dioxide.

27. The device of claim 26 wherein the membrane is substantially water soluble.

28. The device of claim 26 wherein the membrane is substantially water insoluble.